Art. XXIII. *A Treatise on the Chemical, Medical, and Physiological properties of Kreosote, illustrated by experiments on the lower animals, &c. &c.* By John Rose Cormack, Member of the Roy. Med. and Roy. Phys. Soc. of Edinburgh. Edinburgh, 1836, p. 211 and 134.

Various articles in the Journal de Pharmacie. Vide the Nos. for January, 1833, p. 27; October, 1833, p. 544; June, 1834, p. 362; February, 1836, p. 89, &c. &c.

For several years past the dry distillation of organic substances has engaged the attention and excited the interest of European chemists. This process consists in subjecting them, when deprived of moisture, to a high temperature. By this means the elementary principles of the body are acted on; they enter into new combinations, so that the products are the result of its destruction or decomposition by heat. Before the temperature is very much elevated, carbonic acid gas is given off, followed by carbonic oxide, water, acetic and other acids, and lastly come the oily and less volatile parts. If the substance contain any nitrogen, part of it unites with some of the hydrogen to form ammonia, and some may also combine with part of the carbon and produce cyanogen. After a certain period these compounds cease to be generated, and there remains a quantity of carbon uncombined with any other substance, which no increase of heat will volatilize.

In 1830, M. Reichenbach, a chemist of Blansko, while engaged in the investigation of this curious and interesting subject, discovered kreosote and five other substances, all of more or less value in medicine and the arts, and all products of the destructive distillation of vegetable matter. The names of the other bodies are eupione, capnomor, paraffine, picamar and pittacal. These important discoveries were announced to the scientific world in M. Schweigger-Seidel's Journal for 1830.

Eupione derives its name from the Greek, ευ, *very*, and πιων, *greasy*. It is an oily substance, destitute of taste, colour and odour; it is the lightest known liquid, having a specific gravity of only .655. It probably contains less carbon than paraffine, but differs in no other respect from that substance. Eupione exists more abundantly in the animal than in the vegetable tars, and is obtained most readily by distilling the tar of bones.

Paraffine is so called from its remarkable dissimilarity (*parum* and *affinis*) to all other substances. Professor Christison of Edinburgh discovered about the same time with M. Reichenbach, and read an account of it in 1831 to the Royal Society of Edinburgh. He called it petroline, because he first obtained it from petroleum; but it has generally retained the name of paraffine given to it by its first discoverer.

Capnomor is a constituent part of smoke, and hence it derives its name; καπνος, smoke, and μοιρα, part. This substance possesses an agreeable but not very strong odour, somewhat resembling ginger.

Picamar is the bitter principle of tar "*in pice amarum.*" It is a thick, oily, colourless liquid, with a peculiar but not disagreeable odour.

Pittacal (from πιττα, pitch, and καλος, beautiful,) is of a fine blue colour, and may be fixed as a dye. It contains nitrogen, and seems to belong to the same class of substances as indigo; like that body, when rubbed, it acquires a metallic lustre. It is insipid, inodorous, not volatile, and almost insoluble in water. No other chemist but Reichenbach has obtained this substance.

Kreosote, however, is by far the most important of all the products of destructive distillation, both on account of its chemical properties and its numerous practical applications. It was first discovered by Reichenbach in impure pyroligneous acid, and afterwards in all the tars. Its name is derived from κρεας, flesh, and σωζω, I save.

It is an oily fluid, transparent, and when pure, perfectly colourless; its odour is very similar to that imparted to meat by wood smoke, varying, however, according to the species of tar used in its manufacture. It possesses a burning taste, followed by sweetness; its specific gravity is 1037, and boils at 397 F. It is readily combustible in the atmosphere, and burns with much smoke. When dropped on paper it leaves a stain, which soon disappears, and more speedily if a gentle heat be applied. Kreosote unites with water in two different proportions; one of the combinations being a solution of one part of kreosote in four hundred parts of water, the other a solution of ten parts of water in one hundred of kreosote. Ether, alcohol, eupione, carburet of sulphur, oil of petroleum, naphtha, and acetic acid combine with it in all proportions. It also forms a number of interesting compounds with both acids and alkalies.

The most important chemical property of Kreosote is its power of coagulating albumen, as on this no doubt depends its powerful antiseptic virtue. J. R. Cormack, Esq. of Edinburgh, in his valuable treatise on this article remarks that the action which takes place when albumen is coagulated is not exactly ascertained, but may be explained according to the hypothesis of Fourcroy by supposing that oxygen gas is absorbed. One principal reason for believing that the antiseptic property of kreosote depends upon its coagulating albumen is, that albumen does not putrify when coagulated. This property of kreosote has been applied to a great variety of useful practical purposes: and among others, it is stated in a memoir by M. Martin Solon, read before the Academy of Medicine at Paris, to be particularly valuable for the preservation of anatomical preparations.

It has also been successfully applied to the preservation of fresh meats, and hence may become an important article in domestic economy. The meats intended to be prepared should be immersed in a solution of one part of kreosote in a hundred of water: here they should remain from twelve to forty-eight hours, according to their size, when they are to be dried either in the sun or before the fire, and afterwards set aside for six or eight days, at the end of which period they will be found to have acquired the consistence, appearance, smell and taste of the finest smoked meat.

As already stated, kreosote is probably the most efficient substance yet discovered for the preservation of dead bodies of whatever kind. Birds poisoned with it resist putrefaction for a great length of time, and the bodies of animals may be *mummified*, so as to keep them sound for an indefinite period, by immersing them in a solution of kreosote in water, or by injecting a mixture containing kreosote into the blood-vessels, and the embalment may be rendered more complete by filling the cavities of the cranium, thorax and abdomen with the same solution.

And indeed from recent investigations, it has been ascertained beyond a doubt that the tarry and resinous substances from which kreosote is chiefly manufactured, were the very articles used by the ancient Egyptians in the process of embalming, and by means of which their mummies have been handed down to after ages—mementoes of the skill and science of that gifted people, as imperishable and as wonderful as the Pyramids themselves. It is stated in the Asiatic Journal for February 1836, that Lieut. Col. M. E. Bagnol presented to the Royal Asiatic Society a human hand and a piece of beef, preserved by means of a preparation of vegetable tar found on the borders of the Red Sea, in the vicinity of Mocha. The Bedouin Arabs, with whom he conversed on this subject, were of the opinion that this vegetable tar, called in their language Katran, was the article chiefly depended on by the ancient Egyptians in the process of embalming. They also believed that large quantities of camphor, myrrh, aloes and frankincense were used, but these are evidently not essential as the tar alone penetrates and discolours the bone. The only use now made of this tar is as a plaster or ointment for the sore backs of horses and camels, rot in sheep, and lastly, in the preparation of the heads of criminals sent from the distant provinces to the seat of government. The tar is obtained from the branches of a small tree or shrub, which is found in most parts of Syria and Arabia Felix.

The process by which Kreosote is procured is complex and difficult: that of Reichenbach has been simplified and improved by other chemists. The following is the mode recommended in the "*Annales de chimie et de Physique*" of July 1835, by M. Koene. The tar derived from pit coal, is distilled in a retort provided with a long tube, having a large mouth. Under this is placed a receiver. The oil which comes over first swims on water, and it is necessary to remove from time to time the products of the distillation, till an oil is obtained which sinks in water. When this is found to be the case, the product is collected. The heavy oil obtained during the distillation condenses not only in the receiver, but also in the tube of the retort, where it unites with the naphthaline forming a buttery substance. By applying a gentle heat, the mass will drop into the receiver. The product is now allowed to remain in a cool place for some hours, after which it is pressed. The expressed naphthaline still contains oil, which is separated by heating it with its own weight of acetic acid till it melts. After allowing it to cool, the crystallized naphtha is pressed; and the acid adhering to the kreosote is saturated with sub-carbonate of potash. The kreosote is now to be shaken for a quarter of an hour with phosphoric acid, the proportions being half an ounce of the acid to twenty ounces of the oil. The mixture ought then to be agitated with its volume of water, and afterwards distilled with a graduated heat, care being taken to separate the oil which floats on the surface. The rectified oil is now to be dissolved in its own volume of a hot solution of caustic potash of the specific gravity 1120. When it has been allowed to cool for half an hour, the supernatant oil is again removed, and the heavy oil again treated with the caustic potash, only a fourth part, however, of the solution being this time employed.

On uniting the solutions of potash, a slight excess of diluted phosphoric acid is added, and the free kreosote which floats on the surface is separated. It is again rectified; and the first product, which is chiefly water being rejected, the kreosote comes over quite pure.

The mummified flesh of dead bodies has at various periods been prescribed for a number of diseases, similar to those for which kreosote is now used. It has been employed from the earliest ages. Avicenna recommends it in cutaneous diseases, fractures, abscesses, contusions, nausea, dyspepsia, hemoptoe, ulcerated lungs, palpitation of the heart, &c. It was at one time in great vogue in England and France, and is mentioned in most of the old works on the Materia Medica. Lord Bacon highly extols its power in arresting hemorrhage.

Mummy is even now, according to Madden, often prescribed by Arabian physicians. They mix it in powder with butter so as to form an ointment called *mantey*. It is used particularly for ulcers, and is considered an excellent remedy for them.

Pettigreu states that mummy fell into disrepute, not from any change of opinion respecting its virtues, but from the disgust excited on account of the mode in which it was prepared. It was discovered that the European market was supplied entirely by a company of Jews, who prepared a species of mummy in Egypt with the common bitumen of the country, and that they made use of the bodies of criminals, of those who died of the plague, and indeed of any subjects they could procure.

The Persian Ambassador presented Louis XIV. with two golden boxes filled with this precious substance. The following account is given of the presentation speech. "L'Ambassadeur de Perse dit á Louis XIV. que le baume momié etoit un specifique pour les fractures des os, et generalement pour toutes les blessures; qu'il etoit employé pour les maladies et ulceres tant internes qu' externes: en un mot qu'il avoit la proprieté de faire sortir le fer qui pouvoit étre dans les blessures."

Kreosote has now been a sufficient length of time before the public, to enable us to ascertain pretty certainly and accurately its real value as a remedial agent. We can calculate the deductions to be made from the extravagant commendations of its discoverer and early friends; and the allowances for the scoffs and gibes of that class of medical practitioners, who never admit that new articles of the materia medica can possibly have any merit or efficacy.

Reichenbach among his first experiments applied the kreosote to slight *scalds*, in which he found it eminently beneficial. Suppuration was arrested and the sores healed rapidly. In the treatment of *burns*, it has been employed in France by Berthelot and Goupil (*Bulletin Général de Therapeutique*, Feb. 1834.) They state that it has a remarkable tendency to cause the sores to cicatrize, from the circumference to the centre, and thus prevent those irregular contractions, which in so many instances produce permanent disfigurement; a crust in the first instance forms on the injured surface which spontaneously separates in a few days. In this, as in most cases of the application of kreosote, suppuration is prevented from taking place, or if it has commenced, this diseased action is arrested. This article, therefore, seems particularly adapted to burns as it prevents the two worst consequences of these accidents, viz: extensive suppuration and the contraction of the cicatrices. In our own practice the kreosote has answered in burns better than any other application.

Reichenbach records two cases of *caries* cured by the application of lotions of kreosote and water. Reports from other surgeons, however, are less favourable.

M. Frémanger recommends the following ointment for this purpose: ℞. simple cerate, oil of sweet almonds, of each ℥i.; kreosote, 30 minims—mix.

There is scarcely any disease, in which, according to the concurrent opinion of numerous physicians, kreosote has proved more beneficial than in that torturing and obstinate affection, *tooth-ache*. It has been employed on the continent for the relief of tooth-ache ever since its discovery; and for the last two years it has been prescribed very extensively in Edinburgh, and according to Dr. Cormack with very great success. We have used it repeatedly in our own practice, and although it has occasionally failed, we have no hesitation in pronouncing it superior to any remedy in common use.

According to Dr. C., and our own observation confirms the correctness of the remark, unless there be a cavity in the tooth through which the kreosote can be applied to the nerve, as a *general* rule (to this, however, there are exceptions,) no advantage will be derived from it. Where the pain is merely rheumatic, without the tooth being at all carious, a solution of kreosote in water is highly useful, relieving more speedily, certainly, and for a longer time than any other remedy.* Dr. Cormack, in the treatise already quoted, remarks that he tried it in his own person with a carious tooth, with complete success. He introduced it undiluted into the cavity, and as soon as the transient pain caused by its irritating character had subsided, he was perfectly relieved. Before this, he was generally attacked every damp day with pain, and had repeatedly tried many of the ordinary remedies without benefit. He did not now suffer a twinge for several months; the pain then returned, when a second application of the remedy was again successful, since which he has remained perfectly well.

Various explanations of the modus operandi of kreosote in these cases, have been offered, but none seem entirely satisfactory.

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*Fremanger recommends the following wash, as being eminently useful in irritation of the gums. R. distilled water ℥ij. pure kreosote four drops—mix.

1st. It has been supposed that the remedy produced its effect by destroying the nerve: to this it has been objected that if the nerve were destroyed, the pain would never return, whereas in most cases of relief from the use of kreosote, the pain returns after a considerable lapse of time. But the destruction of the nerve, it may be rejoined, may be partial only, sufficient to paralyse its sensibily for a while, but not sufficient to prevent a return of this sensibility.

2nd. The kreosote may unite chemically with the albumen of the fluids, which are always exuding from the cavity of a carious tooth, and thus form a crust to protect the nervous pulp from the irritating action of the atmosphere.

3d. It may perhaps afford relief by stimulating the loaded vessels of the nerve, causing them to contract and expel the blood with which they are surcharged.

The practitioner should be careful to cleanse the cavity thoroughly before employing the kreosote: the best mode of introducing it, probably, is by means of a camel's hair pencil. After this has been done, the cavity should be filled with cotton saturated with pure kreosote, care being taken, if possible, to prevent any adhering drops from touching and irritating the adjacent soft parts. If this accident should happen, however, the pain is but momentary and is not attended with any serious consequences.

Kreosote undoubtedly possesses in an eminent degree the power of *arresting hemorrhage* from the capillaries; yet its usefulness in this respect is considerably diminished on account of its tendency to prevent union by the first intention, as it can with difficulty be employed where this result is desirable.

Dr. Hoering of Neustadt, has experimented on living animals for the purpose of ascertaining its styptic properties.* He found that the bleeding from large arteries and veins was arrested by the application of a dossil of lint soaked in a solution of kreosote. Dr. Bichthauer, of Kungelsan, found it very efficient in arresting bleeding from a leech bite, which was very profuse, and had resisted various other modes of treatment, and under which the patient was rapidly sinking.

Dr. Elliottson has published several interesting cases of *cutaneous diseases*, in which the kreosote has effected a cure after various other means had been tried in vain. Professor Wolf, of Berlin, cured in eight weeks, a case of impetigo sparsa of twenty-five years standing, with fomentations of kreosote and water. We have ourselves frequently used it in cutaneous diseases, and with great advantage, both internally and externally in the form of ointment as well as lotion.

It is also highly recommended in *chilblains*. Dr. Hahn, of Stuttgart, says that whether they be ulcerated or not, he accomplishes a cure in the course of a few days with fomentations of the solution of kreosote in water. Dr. Cormack prefers equal parts of kreosote and almond oil. In a case of two or three years' standing occurring in our practice, the itching and inflammation were promptly relieved by washing the parts in a weak solution of kreosote.

Ulcers of various kinds, but particularly those of a scrofulous, aphthous, phagedenic or venereal character, are readily cured by kreosote. Dr. Shortt of the Royal Infirmary of Edinburgh, used it successfully in an extensive scrofulous ulcer of the hip, which had resisted a great variety of treatment: it at last yielded to kreosote and was ultimately entirely cicatrized. In aphthous ulcerration, it is also highly recommended. The following formula of Magendie was used with complete and speedy success in a very bad case of this kind. Kreosote half a drachm, gum arabic one ounce and a half, camphor mixture ten ounces and a half, mix and use it as a wash every two hours.

The recommendations in favour of its employment in chronic venereal ulcers of the most obstinate character, are very strong. M. Lessére (*Bulletin Géné-*

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*Gazette Medicale de Paris, Dec., 1834.

ral de Therapeutique) has published the following striking case of this description. On the 10th of September, 1833, a patient came to consult him under the following circumstances: on the uvula, velum palati and left tonsil were deep seated ulcers, of a livid colour, with abrupt edges. The neighbouring tissues were in a state of violent inflammation, and he experienced great pain in deglutition. During the month of December, the inflammation was subdued by antiphlogistic measures, and the ulcers were touched from time to time with nitrate of silver. The ulceration still continued its ravages, destroying the uvula, velum palati and the affected tonsil. Diluent drinks, sarsaparilla, extract of parsley root, and lastly eighty mercurial pills with opium were given: but they only served to aggravate the pain. During this treatment, the ulcers neither increased nor showed any inclination to heal. In the beginning of March the water of kreosote was applied six or eight times to the ulcerated surface by means of a pledget of lint, and in fifteen days the cicatrization was completed.

Several cautions should be borne in mind by the practitioner in the application of kreosote to ulcers. It is of great importance in regulating the strength of the solution, to remember that water dissolves only one-eightieth part of its weight of kreosote. If a small excess of kreosote be present, it will not fall to the bottom, but will float on the surface in the form of minute globules: and of course when the lint or brush is dipped in the solution, these globules will adhere, and thus a much stronger preparation than was intended will be used. It is sometimes advisable to apply pure kreosote to ulcers; but this is not generally the case; it always produces more or less irritation, and if it be applied at all in this way, it is better to wait after each application till this disagreeable effect has entirely disappeared.

It is proper to apply this article more frequently in the beginning of the treatment than afterwards, and when the ulcer assumes a healthy appearance it may be discontinued entirely. Various modes of application have been used; in solution, by means of a pledget of lint, or camel's hair pencil—in the form of ointment—or on the surface of an emollient poultice. Dr. Shortt has occasionally employed the following formula:—Take of kreosote, ten drops; vinegar, two drachms; water two ounces—mix.

Kreosote very effectually corrects the *fœtor of ulcers* and other acrimonious discharges; but whether it is better for this purpose than the chlorides, I am not able to state. It has been tried in diseases of the eye, in gonorrhœa, and in cancerous affections; but generally with very little benefit. M. Breschet, however, reported one case of cancer to the Academy of Medicine, which was greatly relieved by it; while in other instances it was entirely inert.

Of all the beneficial effects of kreosote, there is none probably more important than its power of *allaying the irritability of the stomach*, and of controlling the most obstinate cases of nausea and vomiting, arising from nervous excitability, without any organic disease of that organ. Its power in affections of this character, remarks Dr. Cormack, exceeds all other known remedies. This application of kreosote was accidentally discovered by Dr. Elliottson, from observing that in cholera it stopped the vomiting, although the other symptoms still continued, and the case hurried on to a rapidly fatal termination. Dr. E. says, he never knew it to fail in arresting vomiting, proceeding from functional derangement merely. (See this Journal for May, 1836, p. 152.) Drs. Shortt and A. T. Thompson of London, concur in this statement.

Dr. E. also prescribed it with great advantage in a case of vomiting from arsenic; and several times successfully for that obstinate and distressing malady, "sea sickness."

A short time since, the writer of this article had an opportunity of testing its efficacy in a most violent and long-continued instance of nausea and vomiting in a parturient woman. This difficulty commenced at about the sixth week of pregnancy, and had resisted a great variety of treatment for several weeks, till she was reduced to the lowest stage of weakness and depression. Carbonate of soda, calcined magnesia, effervescing powders, enemata, gentle purgatives, every variety of diet, ice, opium, &c. &c. had all been tried in vain, or with only slight and temporary benefit. Upon learning the course that had been pursued with her, I immediately recommended the kreosote, and was most agreeably surprised at seeing the complaint promptly and entirely yield to its efficacy. She was ordered one drop in a little sweetened mucilage every two hours: in one day after commencing this treatment she was considerably better; and on the third the vomiting wholly ceased; and she has now enjoyed for more than two months as good health as females in her situation generally do. H. L.

ART. XXIV. *Dissertation on the question, how far are the external means of exploring the condition of the internal Organs to be considered useful and important in Medical practice.* By ROBERT W. HAXALL, M. D., of Richmond, Va.—pp. 108.

Our readers may not be aware that the Boylston prize of fifty dollars is annually awarded at Boston to the best essay on a subject named by the committee the preceding year. The subject of the prize for 1836, was the utility of physical signs in the exploration of the diseases of the thorax and abdomen. The prize, strictly so called, was awarded to Dr. Holmes, of Boston, but the essay furnished by Dr. Haxall, and the one by Bell, were so excellent, that two other prizes were awarded at the special request of the committee.

The style of Dr. Haxall's dissertation is clear and simple, and perfectly suited to his subject. The memoir is necessarily short, and cannot therefore offer a minute account of all the physical signs connected with the diseases of the chest and abdomen, but it is sufficiently detailed for a fair and lucid exposition of their utility. The author writes like one who has entered into the spirit of his subject and has made himself familiar with the physical signs by that practical attention which can alone avail the practitioner. It is not sufficient to have read the works on auscultation, nor is it enough to have acquired a knowledge of the most prominent signs. No physician can really make the art available for purposes of diagnosis, unless he knows it familiarly. If he possess that acquaintance he may combine the physical with the rational signs of disease in such a way as to render the diagnosis of most affections, and especially those of the chest, vastly more certain than it could be if the ordinary symptoms were alone depended upon. Dr. Haxall has enumerated the various signs, but instead of confining himself to a mere description, he has stated the diseases to which each sign is chiefly applicable, and has entered more fully than has been usual in most treatises of the kind into the diagnosis of abdominal affections, including typhoid fever. He has given to this portion of his subject nearly its full developement, and has shown that the physician should never forget to examine the abdomen, in cases of suspected disease, by the touch and percussion. The author has well described the lesions of the thoracic organs and the physical signs corresponding to them. He is remarkably correct in the description, and although the subject is not carried to its full extent, enough is said to show that no single means of diagnosis is nearly as useful to the physician as the physical signs. There the greatest utility consists in the practitioner's application of the knowledge they furnish.

W. W. G.